

GOVERNMENT OF INDIA
METEOROLOGICAL DEPARTMENT

INDIA WEATHER REVIEW, 1945

ANNUAL SUMMARY

PART C

STORMS AND DEPRESSIONS

CONTENTS

Depressions and Cyclonic Storms	Page C1-C8	Local Storms	Page C10-C11
Western Disturbances	C9		

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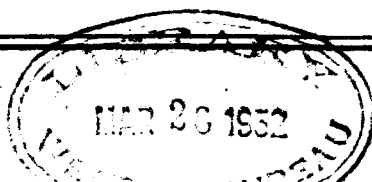
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INDIA WEATHER REVIEW, 1945.

ANNUAL SUMMARY

PART C.

STORMS AND DEPRESSIONS.

I.—DEPRESSIONS AND CYCLONIC STORMS

During the year, four storms and eleven depressions formed in the Bay of Bengal and one land depression over Chota Nagpur. One of the depressions which formed in the extreme southwest Bay early in November, moved out as a low pressure wave into the southeast Arabian Sea across Ceylon, and later, revived there as a depression. As neither ship's observations nor any observations from Burma and Port Blair were available, accounts of storms and depressions forming in the southeast Bay and moving towards the Burma coast have been written almost entirely on the basis of coastal observations and reports from aircraft undertaking reconnaissance and other flights over different regions of the Bay of Bengal and over Burma.

The dates on which the storms were in existence and the greatest barometric depths observed during their life are given in the table below :

TABLE I.

S. No.	Locality	Month	Date	Greatest observed barometric depth.
1	Lat. 12½°N Long. 86½°E	December (1944) January (1945)	31st-1st	8mb. (estimated)
2	Sandheads	July	1st-2nd	15.6 mb.
3	Masulipatam	October	16th—19th	20.6 mb.
4	Lat. 12°N Long. 84°E	December	12th-13th	12 mb. (estimated).

The detailed descriptions of these storms and depressions are given first ; these are followed by a list of the western disturbances and the important local storms during the year.

1. Cyclonic storm of 31st December 1944 to 3rd January 1945.—Aircraft reports received on the 29th and 30th indicated a strengthening of the northeast monsoon in the southeast Bay where conditions were becoming unsettled. The upper winds along the Circars Coromandel coast and in Ceylon had strengthened and were showing a cyclonic circulation. By the 31st morning, aircraft reports indicated a further accentuation of the upper cyclonic circulation. A depression had apparently formed and the upper winds at 1,000 ft. at stations along the Circars, Coromandel and Ceylon coasts placed the centre within two degrees of Lat. 10°N., Long. 87°E.

The following aircraft reports received in the afternoon of 31st indicated a strengthening of the depression, probably into a cyclonic storm in view of report No. 3, with its centre within a degree of Lat. 12½°N., Long. 86½°E.

TABLE 2.

S. No.	Position.	Height	Time of observation.	Wind		Weather and cloud.
				Direction.	Force	
1	Lat. 14½°N. Long. 87½°E. }	2,000 ft.	07 GMT	E	9	Overcast
2	Lat. 14°N. Long. 86½°E. }	2,300 ft.	08 GMT	NE	10	Do.
3	Lat. 14°N. Long. 85°E. }	200 ft.	08 GMT	NE	10	Do.

Aircraft reports received on the morning of 1st January 1945 indicated that the cyclonic storm had weakened into a depression, was centred near Lat. 13½°N., Long. 87°E. and was now moving northeast. No observations were received from the sea area on the first evening but upper winds along the Circars-Coromandel coast indicated a further weakening of the depression and its moving away northeastward.

From aircraft reports received on the 2nd morning, the centre was located within two degrees of Lat. 15°N., Long. 89°E. No observations were received from the affected area on the 2nd evening and 3rd morning. On the 3rd evening, aircraft from off the Arakan coast reported light to moderate SW to WSW winds and clear skies. The depression had either filled up or moved away northeastwards as a low pressure wave across the Arakan coast.

2. Shallow Bay depression of 6th January 1945.—

In association with an active western disturbance, a trough of low was induced over the Central Provinces and the north Deccan on the 5th morning. By the 5th evening the trough had moved eastwards to the Orissa-Bengal coast where pressures were falling rather rapidly, and on the 6th morning it had emerged into northwest angle of the Bay where a shallow depression formed with centre near Lat. 20°N., Long. 89°E. Sandhead reported NE wind of force 3, Chandbali N of force 4, Chittagong SSW force 2 and Nankhali SSE force 2. Upper winds at 1,000 ft. were NNE force 5 at Chittagong, ESE force 5 at Narayanganj and S force 5 at Chittagong. Pressure departures over the head of the Bay were of the order of 10 mbs. but the re

had been a general fall of pressure in northeast India. The shallow depression filled up on the 6th evening but a front was still noticeable in the upper air, Calcutta reporting NE force 4 and Chittagong S force 4 at 1,000 ft. By the next morning Chittagong winds at 1,000 ft. became northerly force 6, indicating that the upper front had also passed away eastwards across the Chittagong coast.

In association with this shallow depression, there was fairly widespread rain in northeast India on the 6th and 7th.

3. Bay depression of 30th April to 2nd May 1945.—On the morning of the 28th an aircraft report from about 200 miles southwest of Port Blair gave NW wind of force 5 at a height of 600 ft. and another aircraft from about 70 miles north of Table Island reported easterly wind of force 4 at a height of 100 ft. Slight to moderate seas and overcast skies were reported by both the aircraft, as also by several others from the southeast Bay. There were thus indications that conditions were unsettled in the southeast Bay off the Andamans.

On the 28th evening several aircraft reports from near about the Andamans and from further west and southwest reported rain showers with overcast skies and moderate seas. While on the 29th morning, an aircraft flying at 1,500 ft. along the longitude 90°E. reported northerly wind of force 6 to 7 in all latitudes between 10°N. and 13°N. with overcast skies and rain. By the 30th morning, a depression had formed with its centre near Lat. 11°N. and Long. 92°E., several aircraft from the southeast Bay reporting rain showers and very rough seas.

Aircraft reports received from the southeast Bay on the 1st morning showed that the depression had moved northwest and was centred near Lat. 14½°N., Long. 89°E. Two other aircraft reports, one from off the Arakan coast and the other from off the Tenasserim coast, however, gave indications that the depression was now recurving and moving northeast. The former gave SE force 4 at 11,000 ft. and the latter gave SW force 6 at 10,000 ft.; both reported rain showers. No observations from near the disturbed area were received on the 1st evening. On the 2nd morning, aircraft reports indicated that the depression had moved northeast and was centred within 2 degrees of Lat. 17½°N., Long. 91°E. The depression was centred near Lat. 19°N., Long. 93°E. on 2nd evening, when an aircraft near Lat. 19½°N., Long. 91°E. reported overcast skies with northerly wind of force 7 at 2,000 ft. On the 3rd morning the depression, which had, by now, become shallow was crossing the Arakan coast.

4. Land depression of 26th June to 1st July 1945.—The seasonal trough of low pressure over the Gangetic valley became accentuated on the 24th June, and by the 26th morning a shallow depression appeared over the northeast Central Provinces and the adjoining parts of Chota Nagpur. During the next 24 hours it moved slowly westwards as it intensified and was centred about 60 miles eastnortheast of Pendra at 9 hrs. of the 27th. Intensifying further as it moved westnorthwestwards, it lay as a deep depression with its centre near Jubbulpore on the morning of the 28th and near Brijnagar on the next morning. Thereafter it weakened, but continued to move westnorthwest; it was centred between Kankroli and Jodhpur on the 30th morning and merged into the seasonal trough of low pressure in the course of the next 24 hours. In association with the formation and movement of this depression the monsoon strengthened over the region from the northeast Central

Provinces to Rajputana and along the west coast. Widespread and locally heavy rain fell in the central parts of the country, Rajputana, Gujarat and along the west coast of the Peninsula. Some of the noteworthy amounts are:

June 28th.—Rajgarh (C.I.) 9·6", Sheopur (C.I.) 7·3".

June 29th.—Garoth (C.I.) 12·7", Bhanpura (C.I.) and Pirawa (C.I.) 10·5" each, Guna (C.I.) 10·0", Malhanagarh (C.I.) 8·6", Abu Road 8·3", Machalpur (Indore) 7·9", Dharmapur and Brijnagar 6·5" each.

June 30th.—Sumel (C.I.) 9·8", Talen (C.I.) 7·3".

July 1st.—Baripadri (C.I.) 7·0".

July 2nd.—Salumbar (Rajputana) 7·3", Junagad (Gujarat) 5·0".

5. Cyclonic storm of 30th June to 6th July 1945.—In association with the westward movement of a low pressure wave from north Burma, weather became markedly unsettled in the north Bay of Bengal on the morning of the 30th June. Saugor Island recorded 8" of rain at 0900 hrs. of that day. Sandheads reported northwesterly wind of force 6, Barisal easterly wind of force 2 and Chittagong southsoutheasterly wind of force 2. Pressures had begun falling over stations around the head of the Bay of Bengal. Upper winds, however, did not show a circulation but a front was noticed passing at 2,000 ft. from Sandheads northnorthwestwards. On the morning of 1st July, Balasore reported 5" of rain and Chandbali 4" and pressures were still falling round the head of the Bay; but there was as yet no evidence of a cyclonic circulation. The upper front was, however, still noticeable and a depression formed soon afterwards, concentrating rapidly into a cyclonic storm by 18 hrs., with centre about 50 miles to the east of Sandheads. Saugor Island reported northeasterly wind of force 8 and Sandheads northnorthwesterly wind of force 7. Sandheads recorded a pressure of 989·8 mbs. which was 7·6 mbs. below normal. Cuttack and Puri had each 4" of rain between 09 and 18 hrs. of the day. Moving in a northwesterly direction, the cyclonic storm weakened into a deep depression and was centred at 09 hrs. I.S.T. on the 2nd about 30 miles west of Saugor Island. Sandheads wind had backed since previous evening and was now westsouthwesterly force 7 and Saugor Island wind was southsoutheasterly, force 5. Saugor Island pressure was 984·7 i.e. 15·6 mbs. below normal. The deep depression crossed coast between Saugor Island and Balasore at about 1200 hrs. I.S.T. of the same day and lay with centre about 50 miles east of Chaibasa by 1800 hrs. I.S.T. Continuing to move westnorthwest as it weakened, it was centred about 100 miles southwest of Ranchi on the 3rd 0900 hrs. and near Umaria on the 4th 0900 hrs. With a marked strengthening of the Arabian Sea branch of the monsoon on the 4th, the depression, which was by now shallow, curved to the right and lay at 0900 hrs. I.S.T. of the 5th with centre midway between Jubbulpore and Nowgong. By the 6th morning it weakened further into a low pressure area and was centred over the southwest United Provinces. Moving in a northerly direction thereafter the low pressure area filled up over the hills of the east Punjab by the 7th morning.

In association with the storm, there was a general strengthening of the monsoon and rainfall was fairly well-distributed over the country outside Sind and Baluchistan, between the 2nd and 6th. Heavy falls occurred along and near the track of the depression, particularly to the southwest of it.

6. Shallow Bay depression of 6th to 10th July 1945.—A strengthening of the monsoon over the central Bay was noticeable on the 6th morning. Reconnaissance flights from the area reported strong WSW/SW winds of 35-45 m.p.h. at a height of about 1,000 ft. and occasional heavy rain. In association with this strengthening of the monsoon in the central Bay, conditions became unsettled in the north Bay. The upper winds over Calcutta between 3,000 and 7,000 ft., which were southwesterly on the 5th morning, backed to easterly by the 6th morning. Concentrated fall of pressure was noticeable on the north Madras coast on the morning of the 6th and around the head of the Bay by the evening of that day. By the 7th morning, a shallow depression had formed at the head Bay centred at 09 hrs. I.S.T. near Lat. 20°N., Long. 89°E. Sandheads and Balasore reported NE wind of force 2 and other stations near the coast between Balasore and Barisal reported easterly wind, while several aircraft between latitudes 15° and 18°N. and longitudes 87° and 90°E. reported SW to W winds of force 6 to 8 at a height of about 1,000 ft. Moving northwestwards, the depression was centred a few miles to the north of Sandheads at 9 hrs. on the 8th. It crossed coast just south of Balasore by 1500 hrs. of that day. At 1800 hrs. that evening it lay as a shallow 'low' over northeast Orissa and the adjoining parts of southwest Bengal. The 'low' moved westnorthwest and was centred near Champa on the 9th and near Jubbulpore on the 10th morning. It became unimportant thereafter.

Associated with this depression, there was a strengthening of the Arabian Sea branch of the monsoon and widespread rain with locally heavy falls occurred in Malabar, Mysore, the Konkan, Gujarat, the Bombay Deccan and the central parts of the country between the 6th and 10th. It did not, however, stimulate the activity of the Bay current to any appreciable extent.

7. Bay depression of 20th to 24th July 1945.—A strengthening of the monsoon was noticed over the central Bay on the 18th. Aircraft reports from that area gave westerly winds of 25-45 m.p.h. at 500-1,000 ft. with heavy rain and rough seas. An appreciable fall of pressure (2-4 mbs.) along the Ganjam coast and the backing of the surface winds to a southeasterly direction along the Orissa-Bengal coast on the same morning suggested the development of unsettled conditions in the west Central Bay off the Orissa-Circars coast. On the 19th morning pressures were rising round the head Bay but were still falling along the Ganjam coast. The monsoon trough had been pushed down and was extending well into the west Central Bay. On the 20th evening, a feeble circulation was observed at the surface with its central region near Lat. 18°N. and Long 89°E. Sandheads reported ESE force 2, Chandali NE force 2 and Puri N force 2. Upper winds indicated the existence of a trough extending into the west central Bay of Bengal with its axis along the line joining Puri and Agra. The trough of low pressure concentrated into a depression by the 21st morning, centred at 9 hrs. I.S.T. near Lat. 18°N. Long. 88°E. Sandheads reported E wind, force 4 and an aircraft from near Lat. 16°N. and Long. 86°E. reported NNW wind force 7 at 500 ft. The aircraft also reported heavy continuous rain. Moving in a northerly direction and weakening at the same time, the depression was centred about 50 miles to the southeast of Palasore at 9 hrs. of the 22nd and crossed the coast just north of Palasore during the afternoon. By the 23rd morning it had weakened into a shallow low pressure area over the northeast Central Provinces and east Central India. It filled up in the course of next 9 hrs. but the associated upper air circulation persisted and moved away westnorthwestwards in the course of the next 24 hours.

Associated with this depression, widespread and locally moderate to heavy rain fell in Orissa on the 21st and 22nd. It strengthened the Arabian sea branch of the monsoon and widespread and locally heavy rain fell in Malabar and the Konkan between the 20th and 23rd. It also was responsible for an extension and increase in rainfall over Sind, Baluchistan and the North-West Frontier Province on the 24th.

8. Bay depression of 30th August to 2nd September, 1945.—An advance of fresh monsoon into the west Central Bay across the south of the Peninsula was observed on the 29th morning. Widespread thundershowers were reported from southeast Madras. By the afternoon of that day weather was becoming unsettled over the west Central Bay. The upper winds upto 15,000 ft. over Vizagapatam had changed from west to north-west, while those over the east Deccan showed an increased northerly component. Heavy rain, rough seas and westerly winds of gale force at 600 ft. were reported by an aircraft flying due west from Long. 85°E. to Madras. On the 30th morning a feeble circulation had apparently developed over the west Central Bay. An aircraft from Lat. 14½°N., Long. 86½°E. reported westerly surface wind of force 3, while three aircraft between Lat. 15°N. and 16°N., Long. 90½°E. and 92½°E. reported southerly winds of force 3 to 5. There was a negative pressure departure of over 2 mbs. along the Circars and the north Coromandel coasts. The following aircraft reports received on the afternoon of that day indicated that a depression had formed with its centre near Lat. 16°N., Long 85°E.

TABLE 3.

S. No.	Position.	Height	Wind		Weather and cloud.
			Direction	Force	
1	Lat. 13½°N., Long. 83°E.	400 ft.	WNW	5	Rain.
2	Lat. 14°N., Long. 84½°E.	400 ft.	WSW	5	Heavy continuous rain.
3	Lat. 14½°N. Long. 86°E.	400 ft.	SSW	6	Rain showers.

Moving slowly westwards, without appreciable intensification, the depression was centred near Lat. 16°N., Long. 83½°E. on the morning of the 1st September, when Cocanada reported northeasterly surface wind of force 3, an aircraft from Lat. 13°N., Long. 82°E. reported westerly wind of force 5 at 1,000 ft. and another aircraft from Lat. 14°N., Long 84½°E. reported southerly wind of force 6 at 1,000 ft. Thereafter the depression weakened and was centred close to the coast between Masulipatam and Cocanada at 18 hrs. of that day, when Masulipatam reported a pressure departure of —4.8 mbs. It crossed the coast during the same night. The next morning it lay as a shallow 'low' over north Hyderabad and became unimportant by the evening.

Associated with the formation and movement of this depression, the monsoon was active over the Peninsula where fairly widespread rain occurred on the 31st and 1st with locally heavy falls in Hyderabad on the 1st.

9. Bay of Bengal depression of 6th to 14th September 1945.—On the 5th September morning a slight fall of pressure was noticed along the Orissa-Circars coast, but by the evening pressures along the Orissa-Circars coast fell further and were

about 2 mbs. below normal. By the 6th morning a depression formed with central region near Lat. 18°N ., Long. 90°E . Pressure on the coast was by now of about 3 mbs. below normal the deficiency estimated for the centre of the depression being about 4-5 mbs. An aircraft from near Table Island reported SW wind of force 6 and heavy continuous rain. By 9 hrs. of the next day the depression had deepened slightly and was centred near Lat. $19\frac{1}{2}^{\circ}\text{N}$., Long. $88\frac{1}{2}^{\circ}\text{E}$. Pressures on the Orissa coast had fallen by another 2-3 mbs. and the estimated defect of pressure at the centre was 6 mbs. Moving in a northwesterly direction the depression crossed the coast just north of Chandbali at about 0300 hrs. of the 8th, and lay with centre about 60 miles north of Cuttack at 9 hrs. of that day. Thereafter it weakened, and moving westnorthwest at first and northwest later, it was centred at 9 hrs. of the 9th about 50 miles north of Pendra and was near Nowgong next morning. On the 11th morning it was centred near Gwalior, and on the 12th, about 50 miles north of Jaipur. The depression then took a more northerly course and, moving slowly, was centred about 40 miles to the east of Suratgarh on the morning of the 13th and a few miles to the northeast of Sriganganagar on the 14th. It broke up against the hills of the east Punjab in the course of the next 24 hours.

In association with the formation and movement of this depression widespread and locally heavy rain fell over the region from Bengal and Orissa to northeast Rajputana and the east and north Punjab. The table below gives the averages for some districts together with noteworthy heavy falls:

TABLE 4.

Province and District	District Averages on							Particularly heavy falls
	8th	9th	10th	11th	12th	13th	14th	
ORISSA								
Sambalpur	8th, Nawapara 8.1"
CENTRAL PROVINCES								
Mandla	9th, Shahpura 5.2"
CENTRAL INDIA								
Gird (Gwalior)	3.6	..	..	..	..	10th, Gird (Gwalior) 7.6"
Morena (Bhopal Agency).	3.2	..	..	..	..	10th, Amli 5.8"
Nowgong (Bundelkhand).	10th, Nowgong 6.2"

TABLE 4—contd.

Provinces and District	District Averages on							Particularly heavy falls
	8th	9th	10th	11th	12th	13th	14th	
WEST UNITED PROVINCES								
Agra	4.8	..	..	..	11th, Agra 5.4" Fatehabad 7.1" Bap 7.3", Iti- madpur 6.8"
Mainpuri	3.5	..	..	..	11th, Mustafabad 6.7", Shikhoh- abad 6.8" Kar- hal 7.0".
EAST RAJPUTANA								
Tarawati	4.4	..	..	12th, Khetri 6.3" Pairath 7.6".
Gangapur	12th, Gangapur 7.5"
Alwar	3.5	..	..	12th, Alwar 6.3"
EAST PUNJAB								
Hissar	3.8	..	13th, Budhlada 11.5"
Gurgaon	2.8	..	12th, Hattin 6.0"
Karnal	2.5	3.1	..
Ambala	3.2	..	13th, Dadupur C 5.9"
Jind	3.1	5.7	..	12th, Jind C 5.0", 13th, Dhaneta C 5.5", Jind 7.3".
Patiala	4.2	3.1	13th, Barthala 6.3", 14th, Ko- tra C 5.9".
Jullunder	2.4	4.8	14th, Nawana- shahr 7.1"
Ludhiana	4.7	5.8	13th, Samrala 6.0", Ludhiana 5.5", 14th Sam- rala 6.0", Lu- dhiana 7.6".
Ferozepore	2.3	..	14th, Moga 6.3".
Amritsar	14th, Buchar 6.5".

10. Bay of Bengal Deep Depression of 18th to 25th September 1945.—On the morning of the 16th September a cyclonic circulation was noticed in the upper air above 3,000 ft. over the north Bay. Pressures along the Orissa-Bengal coast were 1-2 mbs. below normal; but by the next morning, pressures had fallen further along the Orissa-Bengal coast and were about 3 mbs. below normal. By the 18th morning a depression formed with central region near Lat. 18°N ., Long. 89°E . Pressure departures along the coast were 4-5 mbs. below normal and the estimated defect near the centre was of the order of 6-8 mbs. The depression intensified slightly as it moved westwards and was centred about 200 miles to the east of Calingapatam on the 19th morning. Continuing to move westwards, it became

deep by the evening of the 19th when the defect of pressure at the centre, estimated from coastal observations, was of the order of 10-12 mbs. The deep depression crossed the coast between Gopalpur and Calingapatam in the early hours of the 20th and was centred at 9 hrs. of that day about 90 miles to the west of Gopalpur. It now moved westnorthwest and was centred about 50 miles to the east of Nagpur at 9 hrs. of the 21st and near Khandwa on the next morning where pressure was about 12 mbs. below the normal. On the next morning the depression was centred close to Baroda. It had already caused widespread and locally heavy rain in west Central India and the Khandesh and had, by now, commenced giving heavy rain in Gujarat. The depression now recurved and moved northeast and was centred near Udaipur on the morning of the 24th. Exceptionally heavy rain fell in Gujarat, Surat recording 23" and Baroda 18" in the 48 hours ending at 9 hrs. on the 24th. Thereafter the depression showed signs of weakening, but continued to move northeast and was centred near Sikar on the 25th morning; it broke up in the Punjab-Kumaon hills in the course of the next 24 hours.

The depression stimulated the activity of both the branches of the monsoon and there was widespread rain with locally heavy falls practically all over the country outside Sind, Baluchistan and the southwest Punjab. Rainfall was particularly heavy in Kandesh, west Central India and Gujarat between the 22nd and 25th and in the East Punjab on the 26th. The river Tapti was in spate and the huts in the low lying areas of the Surat district were reported to have been washed away, rendering thousands of people homeless. Heavy floods in Gujarat were further reported to have caused extensive damage to property and standing crops and serious dislocation of communication and transport systems. Ahmedabad, Surat and Baroda were reported to have been cut off for about 48 hours. The heavy rain in the East Punjab was also reported to have caused serious damage, including loss of property and cattle, particularly in the Ambala-Saharanpur area.

District averages of rainfall for Gujarat and the East Punjab in association with this depression are given in the table below :

TABLE 5.

Province and District	District Averages on				Particularly heavy falls
	23rd	24th	25th	26th	
GUJARAT					
Panchmahals	2.1	10.9	5.0	..	23rd, Godhra 7.7", Kalol 10.1", Holol 19.1", Dohad 10.5", Jhalod 7.3". 24th, Godhra 5.1", Jhalod 11.5".
Surat	10.4	3.3	..	..	23rd, Surat 15.3", Olpad 12.5", Mandri 15.6", Bardoli 14.5", Valod 9.3", Jalpar 9.5", Chikhli 7.5", Bulsar 9.1", Waghai 10.1", Ahwa 7.2". 24th, Surat 8.2", Olpad 11.2".

TABLE 5—contd.

Province and District	District Averages on				Particularly heavy falls
	23rd	24th	25th	26th	
GUJARAT—contd.					
Ahmedabad ..	2.1	3.5	..	..	23rd, Gogha 7.5". 24th, Dhandhuka 7.7", Dheolera 8.2".
Kaira ..	2.2	6.4	3.9	..	24th, Kaira 7.2", Meh- madabad 6.6", Nadiad 8.9", Dakor 5.6", An- and 10.3", Borsad 15.3", Tranza Nag- rana Tanks 6.4", Pinglaj 5.6", Wan- ghroli 6.2". 25th, Nadiad 5.2", Kapadranj 5.5", Bor- sad 5.6", Savli 7.8".
Broach ..	6.2	10.1	..	..	23rd, Broach 6.4", An- kleshwar 7.3", Hansot 6.0", Ilav, 6.1", Vagra 6.2", Amod, 7.6", Jambusar 6.1". 24th, Broach 10.0", Ankleshwar 9.2", Han- sot 8.9", Ilav 7.7", Vagra 11.2", Dehej 6.1", Amod 14.0", Ja- mbusar 13.6"
EAST PUNJAB					
Hissar ..	..	..	3.1	3.4	25th, Hansi 6.1". 26th, Sirsa 5.8", Fateh- abad 5.9", Bunderlada 5.0", Tohana 5.1".
Karnal	..	..	..	2.5	
Ambala	..	..	..	5.4	25th, Rupar 5.0". 26th, Ambala 8.2", Kharar 6.9", Rupar 9.6".
Jind State	..	..	..	3.6	26th, Dhaneta C 7.0".
Patiala	..	..	..	6.0	26th, Kotra C 7.3", Raniki C 7.0", Bas- thala C 10.9".
Kangra	..	..	2.2	2.0	
Hoshiarpur	..	..	2.8	..	
Jullundur	..	2.2	4.3	5.6	26th, Nakodar 5.2", Phillar 5.0", Nawans- shahr 7.6".
Ludhiana	..	..	3.9	7.4	25th, Samrala 5.6" 26th, Samrala 10.4", Ludhiana 7.3".

11. Bay of Bengal depression of 29th September to 1st October 1945.—A strengthening of the monsoon in the south Bay was noticed on the 26th September afternoon when a number of aircraft from the region reported SW-WSW winds of 30-40 m.p.h. at about 1,000 ft. During that night and the following morning, widespread thunder-rain occurred in the southern half of the Peninsula and along the east coast. By the next morning a cyclonic circulation was noticeable in the upper levels above 5,000 ft. over the central and the north Bay. Pressures along the Circars, Orissa and Bengal coasts were 2-3

mbs. below normal and were still falling. On the 28th morning the upper air circulation became more marked and the pressures were 3-4 mbs. below normal along the Circars, Orissa and Bengal coasts. By the 29th morning a depression formed with centre within a degree of Lat. 18°N., Long. 89°E. Widespread rain had fallen along and near the east coast of the Peninsula and in northeast India, with locally heavy falls on the Orissa coast. Pressure was by now rising on the Circars and East Bengal coasts but was still falling on the Orissa coast, where it was now more than 4 mbs. below normal. Moving rapidly westnorthwest and weakening, the depression was crossing the coast just south of Puri by 9 hrs. of the 30th. The rainfall had by now decreased on the Circars and Coromandel coasts but increased in northeast India and was extending into the United Provinces. On the 30th evening, the depression, which had been now weakened was centred about 40 miles to the southwest of Angul. The rainfall had practically ceased over the Peninsula and was also decreasing in northeast India but was extending further into the United Provinces. The shallow depression now moved northnorthwest and was centred about 80 miles northeast of Pendra on the morning of 1st October. Widespread rain with locally heavy falls occurred in the United Provinces, Bareilly recording 4" and Bahraich 3". Weakening further, the low pressure area moved north and broke up in the Himalayas in the course of the next 24 hours; but before doing so, it gave further heavy rain in the sub-montane districts of the United Provinces, Bahraich recording another 7", making a total of 10" in 48 hours ending at 9 hrs. on the 2nd October.

The district averages of rainfall in the United Provinces in association with the depression, together with some noteworthy falls, are given in the table below :—

TABLE 6.

Province and District	District Averages on		Particular heavy falls.
	1st	2nd	
UNITED PROVINCES			
Dehra Dun ..	2.6	..	
Bareilly ..	1.9	..	
Shajahanpur ..	5.6	..	1st, Shajahanpur 9.2", Pawayan 5.9", Tilhar 6.3".
Pilibhit ..	2.2	2.6	
Farrukhabad ..	2.0	..	
Jaunpur ..	3.6	..	1st, Karakat 6.9".
Gorakhpur ..	2.6	..	1st, Pharenda 6.7"
Basti ..	4.5	..	1st, Basti 6.9"
Sitapur ..	2.8	..	
Hardoi ..	2.0	..	
Kburi ..	3.1	..	
Fyzabad ..	3.1	..	
Gonda ..	3.1	..	
Bahraich ..	2.6	7.1	2nd, Bahraich 7.7", Kaisarganj 8.1", Nanapura 5.4"
Bara Banki ..	3.3	..	1st, Sanchighat 7.1".

12. Severe Cyclonic Storm of 15th to 23rd October 1945.—

On the 9th October morning aircraft from the region around the straits of Malacca reported overcast skies and heavy continuous rain and indicated a feeble cyclonic circulation at upper levels. The low pressure wave associated with the trough moved slowly westnorthwest in the course of the next 5 days and on the 14th morning, markedly unsettled conditions were observed in the southeast Bay of Bengal off the Nicobars. A number of aircraft from the region reported overcast skies with rain and one continuous heavy rain. The markedly unsettled conditions concentrated rapidly in the course of the next 24 hours and a cyclonic storm was located on the 15th morning with centre near Lat. 8° N., Long. 91°E. A ship about 200 miles to the southwest of the centre reported westerly wind of force 9. Earlier at about 3 a.m. the steamer Takliwa was reported to have grounded near Car Nicobar. Under the influence of the storm there was a temporary revival of the southwest monsoon in Ceylon and the Coromandel coast; a fall of 5 inches of rain was recorded at Colombo and rain had also commenced at all stations along the Coromandel coast. The storm moved northwest and was centred near Lat. 10° N., Long. 88°E on the 16th morning, and heavy clouding had extended to the north Madras and Orissa coasts by that time. Intensifying in its severity the cyclonic storm was centred within a degree of Lat. 14°N., Long. 84°E., on the morning of the 17th. Strong winds, rough seas and continuous rain had commenced along the Circars coast also, Calingapatam recording 4" of rain on the 17th morning, while the pressure at Cocanada was as much as 5 mbs. below the normal value. By the 17th evening the storm centre moved to Lat. 15°N., Long. 83°E. Heavy continuous rain was falling all along the Circars coast, while strong winds and rough seas continued unabated all along the Circars and Orissa coast. At some coastal stations seas were reported as high, and at 1700 hrs. of the 17th pressures at Cocanada and Masulipatam were 9.7 and 9.4 mbs. below normal respectively. As the storm approached, gales, heavy rain and very rough seas raged in full fury along the Circars coast, and a little before 0800 hrs. of the 18th, the storm crossed the coast through the Godavary estuary. Cocanada reported southeasterly wind of force 9 and Masulipatam westerly wind of force 9 (both estimated). The barometer at Masulipatam stood 17.7 mbs. below normal at 09 hrs. of the 18th, while earlier at 03 hrs. it was 20.6 mbs. below normal. Heavy rain had fallen along the Circars coast, 5 inches being recorded at each of the stations, Masulipatam, Cocanada and Vizagapatam and a heavy tidal wave swept across the coastal belt during the morning hours of the 18th. By 17 hrs. of the same day, the storm, which was now inland, weakened and the winds subsided, and on the 19th morning it was lying as a depression with centre close to Khammameth. The rate of movement slowed down thereafter and the depression recurved to the northeast, its centre being about 100 miles east of Nizamabad on the 20th morning and about 100 miles northeast of Raipur on the 21st. By the 22nd morning the depression had become weak and lay as a shallow low pressure area extending from the east Central Provinces to southwest Bengal, becoming unimportant by the next day.

According to Newspaper reports the tidal wave which accompanied the storm varied in height from 5 to 15 ft. and inundated the coastal tracts of Godavari, Krishna and Vizagapatam districts, destroying standing crops and houses. The gales which blew continuously for more than 12 hours were reported to have wrought havoc on the coastal strip from

Masulipatam to Puri. Roofs of houses were blown away, telegraph and telephone lines were broken and transport was completely paralysed. The loss to property and crops in the Circars districts was estimated at several lakhs of rupees, while human sufferings in the areas stricken by the tidal wave was considerable.

During the weakening stage, the storm gave widespread rain with locally very heavy falls in northeast India. The passage of the storm through Hyderabad and the east Central Provinces was also marked by widespread rainfall in these parts. Some noteworthy amounts of rainfall in association with the storm are given below :—

TABLE 7.

Province and District	District Averages on						Particularly heavy falls.
	18th	19th	20th	21st	22nd	23rd	
MADRAS							
Vizagapatam ..	3.7	2.0	2.0	..	..	..	17th, Gajapatina-gram 5.9", Sompeta 5.1". 18th, Palamkonda 5.7", Narasannapeta 6.0", Pundi 5.8". 19th, Narasapatnam 6.1", Pulaperti 5.9", Chodayam 8.0", Tulabada 6.3".
Vizagapatam Agency ..	..	4.4	..	..	..	..
East Godavari (plains) ..	2.7	..	..	..	..	..	18th, Cocanada 5.0".
Kistna ..	..	..	..	..	..	..	19th, Bezpada 5.8", Avanigadda 7.1", Masulipatam 7.0".
Guntur ..	..	4.0	..	..	..	..	19th, Rentichintala 6.0", Repalle 8.1", Gurzala 6.7", Addanki 5.6", Macherla 7.5".
HYDERABAD							
Gulbarga ..	..	2.0	..	..	..	..
Hyderabad ..	..	2.5	..	..	..	..
Mahabubnagar ..	..	3.0	..	..	..	..
Nalgonda ..	..	3.1	..	..	..	..
Adilabad ..	..	..	..	..	..	..	20th, Asifabad 5.5".
ORISSA							
Cuttack ..	2.2	..	..	..	..	..	18th, Dharmasala 5.2", Rajkanika 6.3". 19th, Rajanilgiri 5.1". 20th, Rajanilgiri 9.7".
Balasore ..	3.0	6.0	3.5	..	..	..	18th, Soro 8.9". 19th, Soro 15.8", Chandbali 6.1", Balasore 5.8", Baliapal 10.1", Eram (Vasudevapur) 5.3". 20th, Balasore 6.5", Bhogra 9.1", Baripada 8.5", Soro 9.9". 19th, Pipili 5.4".
Puri ..	2.7	2.6	..	..	..	..	19th, Mohana 5.7".
Ganjam ..	2.1	..	..	..	..	..
SOUTHWEST BENGAL							
Midnapore ..	2.0	..	..	..	2.3	..	19th, Contai 8.1", Kashari 6.0". 20th Contai 6.0". 22nd Bhagwanpur 11.7". 20th, Saugor Island 5.3". 21st, Saugor Island 6.7". 23rd, Saugor Island 5.1".
24 Parganas ..	..	..	..	3.1	..	2.5	
CENTRAL PROVINCES AND BERAR							
Drug ..	..	..	..	2.0	..	..	21st, Drug 5.2".

13. Shallow depression of 6th to 15th November 1945.—A strengthening of the northeast monsoon was observed on the 3rd November morning, and fairly widespread rain had occurred in southeast Madras and in Ceylon. Conditions became unsettled in the south Bay of Bengal on the 4th and a depression formed in the course of the next two days with centre near Lat. 7°N., Long. 86°E. on the 6th morning. Moving in a northwesterly direction, it was centred at 08 hrs. of the 7th near Lat. 8½°N., Long. 85°E. Rainfall in southeast Madras and Ceylon had decreased on the 5th and 6th but increased again, and the depression moved westnorthwest being centred near Lat. 9°N., Long. 84°E. on the 8th morning. It weakened during the next 24 hours, and on the 9th morning was centred about 100 miles east of Trincomalee. Weakening further it moved westwards as a low pressure wave across north Ceylon and the extreme south Peninsula and emerged into the southeast Arabian Sea where a shallow depression formed by 08 hrs. of the 11th with its central region near Lat. 6½°N., Long. 75½°E. Moving in a westnorthwesterly direction it was centred about 100 miles west of Minicoy at 08 hrs. on the 12th. Its centre could not be located for the next two days due to want of observations from the area, but a few ships' reports from the southwest Arabian Sea received on the 15th showed that the shallow depression still persisted; it had moved slowly westnorthwest and was centred at 8 hrs. of the day within 2 degrees of Lat. 10°N., Long. 65°E. By the evening of the 15th, however, the shallow depression became unimportant.

During the formation and subsequent movement of this depression from the south Bay of Bengal into the southeast Arabian Sea, fairly widespread rain fell in the Peninsula south of Lat. 12°N. Noteworthy heavy falls reported from southeast Madras are :—9th, Kadayannallur 7.1"; 10th, Kattumannarkoil 8.6"; Chatrapatti 5.9"; Sivakasi 5.2"; 11th, Chatrapatti 8.1", 12th, Srivilliputtur 7.7". According to press reports incessant rains in Coimbatore and the adjoining districts caused considerable damage to the standing crops and heavy landslides and breaches on the Nilgiri Mountain Railway.

14. Bay depression of 28th November 1945.—Ships' reports received from the southeast Bay and the Andaman Sea in the afternoon of the 27th November indicated the existence of a trough of low pressure in the south Andaman Sea, and by the next morning a depression had formed centred near Lat. 5°N., Long. 89°E. The ship SS Petard, which was about 60 miles to the southeast of the centre reported SW wind of force 9. The depression apparently weakened thereafter and moving westwards, was centred near Lat. 5°N., Long. 88°E. at 17 hrs. of the day. By the next morning the depression became unimportant but the monsoon continued strong in the south Bay and local thundershowers occurred in the southern parts of Ceylon on the 28th and in Malabar on the 29th.

15. Bay depression of 4th to 6th December 1945.—Weather became unsettled over the south Bay on the morning of the 3rd December. Aircraft and ships' reports from the area showed that a feeble circulation had developed with central region near Lat. 6°N., Long. 88°E. By the next morning a depression formed, centred at 08 hrs. I.S.T. near Lat. 8°N., Long. 85½°E. Moving westnorthwestwards, it was centred at 08 hrs. of the 5th near Lat. 9°N., Long. 83½°E, almost all stations in Ceylon and along the south Coromandel coast having recorded moderate to heavy rain with 5" at Jaffna. The depression then moved westwards and was centred about 100

miles to the northeast of Trincomalee on the 6th morning ; thereafter it weakened and became unimportant by that evening. The northeast monsoon, however, remained active in the southwest Bay for the next two days and continued to cause widespread rain in Ceylon and the extreme south of the Peninsula till the 8th.

16. Severe cyclonic storm of 11th to 15th December 1945.—

Ships' reports from the south Bay on the 10th December morning indicated strengthening of the northeast monsoon there. By the 11th morning a feeble circulation was noticeable with central region near Lat. $8\frac{1}{2}^{\circ}\text{N.}$, Long. 87°E. On the evening of the same day aircraft reports showed that a depression, probably deep had formed in the southeast Bay with its centre near Lat. 9°N. , Long. 88°E. Two aircraft, one from Lat. $10\frac{1}{2}^{\circ}\text{N.}$, Long. 86°E. and the other from Lat. $11\frac{1}{2}^{\circ}\text{N.}$, Long. $83\frac{1}{2}^{\circ}\text{E.}$, reported northerly wind of force 8 and rainshowers. By the 12th morning, the deep depression had moved westwards

and was centred near Lat. $9\frac{1}{2}^{\circ}\text{N.}$, Long. 86°E. The pressures on the Coromandel coast and the east coast of Ceylon commenced falling and by 17 hrs., ships' reports indicated that the deep depression had developed into a severe cyclonic storm centred near Lat. 10°N. , Long. 85°E. SS Samtruts which was about 30-40 miles to the south of the centre reported very high seas and whole gale (WSW, force 10) and a pressure of 993.2 mbs., that is about 20 mbs. below normal. Moving in a north-northwesterly direction the storm was centred near Lat. 12°N. Long. 84°E. at 8 hrs. of the 13th. Thereafter, it weakened as it recurved, and, moving north-northeast, was centred near Lat. $13\frac{1}{2}^{\circ}\text{N.}$, Long. $84\frac{1}{2}^{\circ}\text{E.}$ at 17 hrs. of that day. By 8 hrs. of the 14th it had weakened further into a depression and was near Lat. $14\frac{1}{2}^{\circ}\text{N.}$, Long. 85°E. The centre could not be located on the next day due to lack of observations, and on the 16th morning the depression had become unimportant as shown by ships' observations.

II—ACCOUNT OF WESTERN DISTURBANCES DURING 1945

A list of western disturbances (50 in number), together with a brief summary of the precipitation caused by them month by month, is given in the table below. Details of the individual disturbances are given in the Monthly Weather

Reports for the different months. Some of the disturbances in the earlier part of the year were markedly active, giving widespread rain in many parts of northern India and very cold weather in their wake.

TABLE 8.

Nature of precipitation.	Jan.	Feb.	Mar.	April	May	June	July	August	Sept.	October	Nov.	Dec.	Total
Widespread ..	3	..	2	3	2	1	0	0	1	1	0	0	13
Local or scattered ..	2	3	3	1	2	2	0	0	0	1	3	3	19
Little or nil ..	3	2	4	4	1	0	0	0	0	1	1	3	18
No. of disturbances in each month.	7	5	9	8	5	3	0	0	1	3	4	5	50

The descriptions of two noteworthy western disturbances are given below :—

1. Western disturbances of 3rd to 7th January and 7th to 10th January.—An active western disturbance was noticed moving across Iraq, Iran and the Persian Gulf on the 1st January, causing widespread precipitation along its track. It lay over Baluchistan on the 3rd and over Rajputana on the 4th. Moving across Central India, the north Central Provinces, the United Provinces and Bihar, it passed away eastwards across the eastern Himalayas by the 7th. In association with this disturbance, widespread precipitation occurred over the country north of Lat. 22°N. between the 3rd and 7th. Under its influence, an incursion of moist air also took place in the Konkan and the Bombay Deccan, where local rain fell on the 5th and 6th. There was heavy snowfall in Kashmir and the hills of the Punjab on the 4th and 5th. According to newspaper reports, the snowfall in the hills of the Punjab was the heaviest recorded for many years.

Widespread fog was reported from northwest India on the 5th and 6th, as another disturbance followed in quick succession and was over the northwest frontier by the 7th. This disturbance passed away across the hills of the west United Provinces by the 10th, after causing local to fairly widespread precipitation over the region from the North-West Frontier Province to the west United Provinces between the 8th and 10th. It gave rise to a secondary low over the Gulf of Oman on the 7th, and this secondary, in the course of its movement through the northeast Arabian Sea, Gujarat and the Central Provinces, caused local showers in Sind, Gujarat and the central parts of the country between the 6th and 9th. The secondary became unimportant over the Central Provinces on the 10th, but a low pressure wave associated with it moved away northeastwards

across the eastern Himalayas, giving local rain in Bihar and Chota Nagpur on the 11th and 12th.

In the wake of the first disturbance, a cold wave with temperatures 10-15°F. below normal moved across the northwest frontier and extended southeastwards to Gujarat and west Central India by the 5th. On the 6th it spread further over the region from the west United Provinces to the Bombay Deccan and Hyderabad, and, by the 7th, it extended over the rest of the country outside the south of the Peninsula, but the temperatures in the Punjab and Kashmir had commenced rising due to the approach of the second western disturbance. On the 8th, the temperatures still remained markedly below normal over the Deccan, the Central Provinces and northeast India, but had commenced rising over practically the whole of northwest India, due to the approach of the fresh western disturbance. However, even the approach of the new western disturbance could not wipe out completely the low temperatures over northwest India. As a result, a more severe cold wave followed in the wake of the second western disturbance and spread over the region from the northwest frontier to east Rajputana on the 9th, and extended further to west Central India and the Bombay Deccan during the next 24 hours. By the 11th, the cold wave also affected the west United Provinces and the west Central Provinces. It spread over the east United Provinces and east Central India in the course of the next two days. Both day and night temperatures were 10-20°F below normal in northwest India, the United Provinces, the central parts of the country and the Bombay Deccan during the spells of these two cold waves. Frost temperatures were recorded at many stations along the northwest frontier, in Kashmir and the hills of the East Punjab and in the belt of the country running from Baluchistan to the west United Provinces between the 11th and 13th.

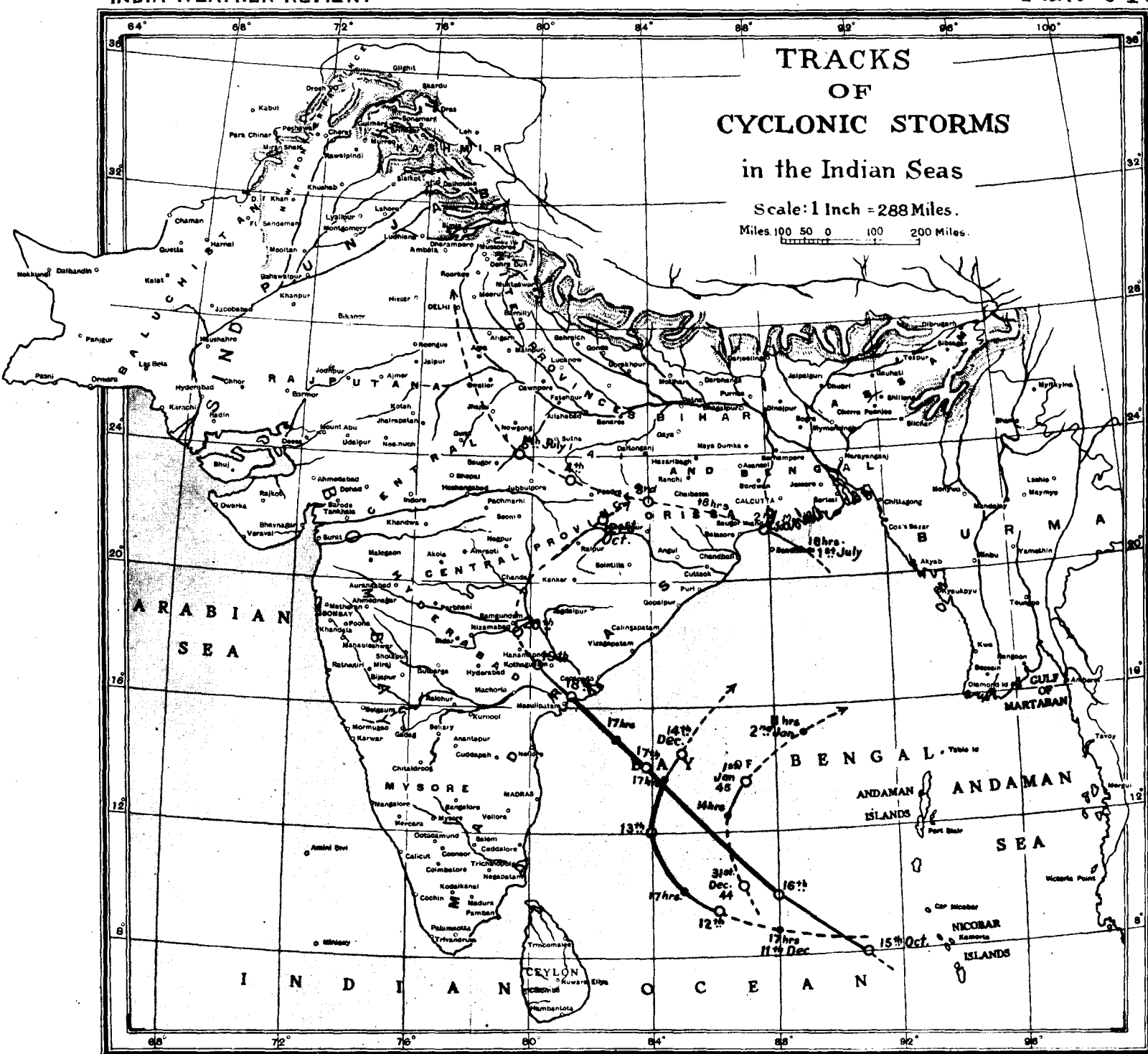
III.—LOCAL STORMS

Of the local storms reported in newspapers the following are noteworthy :—

S. No.	Place.	Date.	Time.	Character of storm.	Reported loss of human life.	Remarks.
1	South Sylhet	January 22nd	9 p. m.	Thunderstorm	..	About 50 dwelling houses and a school building were blown down.
2	20th Bomber Command, H.Q.	March 12th	Night	Severe hailstorm	8	150 persons were injured. 20 to 25 cargo and transport planes were damaged. At one base, wind of hurricane force was reported. A number of buildings collapsed.
3	Kharagpur	March 12th	..	Hailstorm	8	Many injured. Extensive damage was caused to property. A number of huts were blown down and telegraph wires were snapped.
4	Hatiya Coast	March 14th	Early morning.	Thunderstorm	..	Three boats carrying passengers and goods capsized.
5	Beniachong Tana (Sylhet) ..	April 3rd	..	Thunderstorm	..	About 300 people were rendered homeless ; 40 persons received injuries. Roof of a school building was blown away.
6	Elashin	April 10th	After-noon.	Severe hailstorm	..	Many trees and huts fell down. Roof of some jute godowns were blown away.
7	Seraiganj	April 10th	Evening	Hailstorm	..	The hail damaged standing jute and 'til' plants.
8	Between Noakhali and Sandwip	April 10th	..	Nor'wester	..	A boat was capsized due to high winds near the mouth of the Meghna river.
9	Do.	April 12th	..	Do.	..	A boat was capsized due to high winds near Balurona in the Meghna river. The boatmen and passengers were lost.
10	Sandwip Island (near Noakhali)	April 13th	Morning	Heavy hailstorm	..	Sandwip town was under water for sometime. Villages were inundated by rain water and by low tide. Many houses were blown off; many trees were uprooted and extensive damage was caused to the standing crops.
11	Sandwip channel	April 13th	..	Hailstorm	..	A fishing boat capsized.
12	Burdwan	May 4th	Evening	Violent thunder-storm.	2	Trees were uprooted and roofs were blown off. Electric supply and telephone communications were dislocated in some sections.
13	Tangal	May 13th	Night	Severe hailstorm	..	Many houses and big trees were razed to ground; jute and paddy crops were damaged.
14	Konigram	May 13th	Night	Nor'wester	..	Many trees and buildings were razed to ground.
15	Chagalpur	May 14th	Night	Thunderstorm	..	Two persons were injured; a number of trees were uprooted; electric supply was cut off for about an hour.
16	Kalna	May 14th	..	Hailstorm	3	There was a shower of big sized hail for over 20 mins.
17	Madaripur	May 14th	Night	Severe thunder-storm.	..	Several buildings collapsed and a few boats were capsized in the river.
18	Dinaipur	May 14th	Night	Do.	..	Heavy damage was caused to the town.
19	Between Baswa and Rajgarh on the B.B. & C. I. Rly.	May 18th	Afternoon	Severe hailstorm	..	Thirteen vehicles of a goods train were blown off the tract and of these eleven capsized. Storm was accompanied by heavy hailstones about the size of hen's eggs and a considerable amount of damage was done in the locality.
20	Dhanbad	May 22nd	Evening	Nor'wester	..	Thirteen persons were severely injured. Heavy damage to thatched houses.
21	Shamshernagar (Sylhet) ..	May 23rd	..	Furious Nor'wester	9	About a dozen houses were blown away; many persons received injuries.
22	Brahmanbaria	May 27th	Night	Severe thunder-storm.	..	Many houses were razed to ground and many big trees uprooted.

III.—LOCAL STORMS—contd.

S. No.	Place.	Date.	Time.	Character of storm	Reported loss of human life.	Remarks.
23	Hyderabad, Jacobabad, Now-bashah and Karachi districts.	May 29th	..	Heavy sandstorm	..	Roofs of houses were blown away at Tandoodam. Damage was caused to mango crops and fruit trees.
24	Habiganj	About May 30th	..	Violent thunderstorm	..	Many buildings were badly damaged.
25	Bhanugach and Lagga (Sylhet)	About May 31st	..	Severe thunderstorm	..	A number of buildings collapsed ; many persons were injured.
26	Pabna	June 4th & 5th	..	Do.	..	Several houses collapsed ; a number of trees were uprooted. Considerable damage was done to property.
27	Jamalpur and neighbourhood	June 4th	Night	Severe gale	..	Trees were uprooted ; a number of houses were damaged.
28	Brahmanbaria	June 4th	Evening	Severe thunderstorm	..	A number of houses were damaged.
29	Sujanagar (Bengal)	June 4th	..	Thunderstorm	..	Several tin and thatched houses and big trees were blown down ; many houses were severely damaged.
20	Natore	June 5th	..	Severe thunderstorm.	..	A few big trees were uprooted ; many thatched houses were razed to the ground; considerable damage was caused to the mango crop.
21	Between Sikar and Rashidpur Khori (Jaipur)	June 16th	..	Thunderstorm with strong winds	..	A passenger train was derailed ; communications were dislocated.
32	Chittagong	July 30th	Afternoon	Severe Tornado	..	Roofs of several houses were blown off; electric wires were snapped.
33	Feni (Noakhali)	July 30th	..	Tornado ..	..	Several huts were damaged ; a number of casualties were reported.
24	Pandalam (Travancore) ..	July 31st	3.30 p.m.	Violent thunderstorm.	11	Portion of a school house collapsed ; about 30 students were injured.
25	Jullundur (Punjab)	November 7th	Evening	Severe hailstorm	4	Heavy loss of cattle and damage to crops were reported from neighbouring villages. Some hailstones were as big as eggs.



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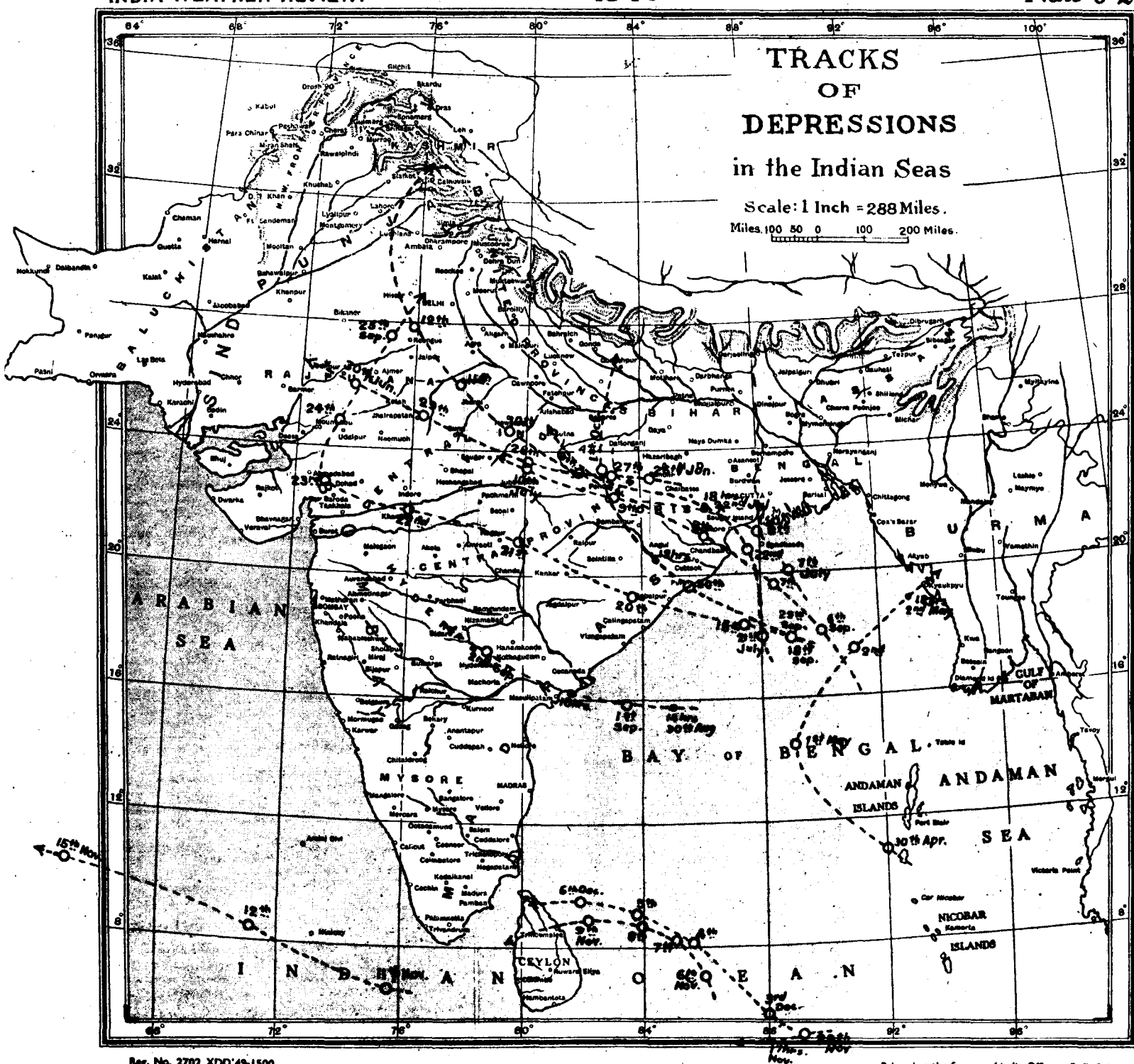
CIRCLE INDICATES POSITION OF CYCLONE OR DEPRESSION AT 9 HRS.

IN THE CASE OF POSITIONS PRIOR TO 15TH OCTOBER, FOR LATER PERIOD IT INDICATES POSITION AT 8 HRS.

----- Depression.

———— Storm.

———— Severe Storm.



CIRCLE INDICATES POSITION OF DEPRESSION AT 9 HRS.

IN THE CASE OF POSITIONS PRIOR TO 15TH OCTOBER, FOR LATER PERIOD IT INDICATES POSITION AT 8 HRS.

PUBLICATIONS OF THE INDIA METEOROLOGICAL DEPARTMENT

(Complete list, up to July 1950, including those publications which are now out of print.)

Instructions to Observers at the 2nd and 3rd class observatories, edition 3 (1942). Rs. 1-10 or 2s. 6d.*	Departmental.
Cloud Atlas, 3rd edition (1945) Rs. 2-2 or 3s. 6d.	Ditto.
Tables for the Reduction of Meteorological Observations in India. Reprint of 3rd edition (1947). Rs. 5-12.	Ditto.
Relative Humidity Tables (1937). As. 7 or 9d.*	Ditto.
Saturation Temperature Tables (1942). As. 10.	K. N. Rao,
Hygrometric Tables (1,000 mb). edition 2 (1949). As. 14 or 1s. 3d.	Departmental.
Hygrometric Tables (900 mb). edition 2 (1948). Price Rs. 1-14-0 or 2s. 9d.	Ditto.
Hygrometric Tables (800 mb). edition 2 (1949) Rs. 2-12.	Ditto.
Hygrometric Tables (700 mb). 1944.	Ditto.
Hygrometric Tables—Vapour Pressure. Rs. 3-8-0 or 5s. 6d.	Ditto.
Handbook of Cyclonic Storms in the Bay of Bengal for use of Sailors.	Sir John Elliot.
Vol. I. Text 2nd Edition (1900). Rs. 4.*	
Vol. II. Plates 2nd Edition (1901). Rs. 1-8.*	
Handbook of Cyclonic Storms in the Bay of Bengal (Abridged) 1948.	Ditto.
Aviation Climatological Tables (1944). Rs. 8-8 or 13s. 6d.	Departmental.
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Cyclone Memoirs—	
Part I. Bay of Bengal Cyclone of May 20th to 28th, 1887 (1888). Rs. 1.*	Ditto.
Part II. Bay of Bengal Cyclone of August 21st to 28th, 1888. (1890). Rs. 3.	Ditto.
Part III. Bay of Bengal Cyclones of September 13th to 20th and October 27th to 31st, 1888 and Arabian Sea Cyclone of November 6th to 9th, 1888. (1890). Rs. 5.	
Part IV. An enquiry into the nature and course of storms in the Arabian Sea and a catalogue and a brief history of all recorded storms in the Arabian Sea from 1848—1889. (1891). Rs. 3.	Ditto.
Part V. Account of three cyclones in the Bay of Bengal and Arabian Sea during November 1891. (1893). Rs. 3.*	W. L. Dallas.
Report of the Midnapore and Burdwan Cyclone of the 15th and 16th of October 1874. (1875). Rs. 3.*	Sir John Elliot.
Report of the Vizagapatam and Backergunge Cyclones of October 1876. (1877). Rs. 3.*	W. G. Wilson.
Report on the Madras Cyclone of May, 1877. (1879). Rs. 3.*	Sir John Elliot.
	Ditto.
Monthly weather charts of the Bay of Bengal and adjacent sea north of the equator, showing mean pressure, winds and currents (1886). Rs. 5.*	H. F. Blanford.
Monthly weather charts of the Arabian Sea and the adjacent portion of the north Indian Ocean showing mean pressure, winds and currents. (1888). Rs. 5.	Sir John Elliot.
Charts of the Bay of Bengal and adjacent sea north of the equator showing the specific gravity, temperature and currents of the sea surface. (1887). Rs. 1-8.	
Climatological Atlas of India (1906). Rs. 27.*	W. L. Dallas.
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Seismological Bulletin (renewed) 1946 Quarterly

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Monthly Weather Report, Each As. 8.

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*Volume for 1902—1906, 1910 and 1912—1917 are out of print.

†Discontinued from January 1921. Copies for 1891—97, January, March and May, 1898 and January 1899 to June, September and October 1902, 1903 and January to March May, June and November 1904, September 1907 February, May to July 1908, January to April and August 1909, January 1911, May and July 1912, April to July 1915 are out of print.

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§The subscription is Rs. 5 for the complete report, inclusive of the evening chart and upper air observations, it is Rs. 3 exclusive of these items: in either case the price includes postage

§These prices include postage in India.

NOTE.—

1. All the priced publications excepting the Daily, Weekly and Monthly Weather Reports and those items which are not out of print are available for sale with the Manager of Publications, Civil Lines, Delhi.

various Indian Daily Weather Report, Weekly Weather Report and Monthly Weather Report are available for sale in the office of the Deputy Director General of Observations (Forecasting), Meteorological Office, Poona 5.

3 The Regional weather Summaries for Calcutta, New Delhi, Nagpur, Bombay and Madras are available for sale at the respective Regional Meteorological Centres